

an electron control unit for generating a repulsive electric field to allow acceleration of the electrons emitted from the plurality of filamentary cathodes in the direction of the display unit.

A negative potential is applied to the electron control unit. The electron control unit may be a plurality of grids that are shaped as a mesh, or it may be a layer of a transparent electrically conductive material such as tin doped indium oxide (ITO) deposited on the other substrate.

According to another aspect of the present invention, a VFD further comprises a control electrode, located around the electron emissive means, for controlling the trajectories of the electrons emitted from the electron emissive means.

Both the foregoing general description and the following Detailed Description are exemplary and are intended to provide further explanation of the invention as claimed.

#### **BRIEF DESCRIPTION OF THE DRAWINGS**

The accompanying drawings provide a further understanding of the invention and, together with the Detailed Description, explain the principles of the invention. In the drawings:

Fig. 1 shows an exploded projection of a vacuum fluorescent display according to a first preferred embodiment of the present invention;

Fig. 2 shows a cross section of a vacuum fluorescent display according to the first preferred embodiment of the present invention;

Fig. 3 shows a cross section of a vacuum fluorescent display according to a second preferred embodiment of the present invention;

Fig. 4 shows a cross section of a vacuum fluorescent display according to a third preferred embodiment of the present invention; and

Fig. 5 shows a cross section of a prior art vacuum fluorescent display.

### **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS**

The present invention will be described in detail with reference to the accompanying drawings.

Referring to Figs. 1 and 2, an evacuated envelope of a VFD according to the present invention is sealed with a face glass 20, a base substrate 22 and side glasses 24. The base substrate 22 comprises a wiring layer (not shown) covered with an insulating layer 26. A conducting layer 30 is formed on the insulating layer 26 and provided with a positive potential by a through hole 28. The conducting layer 30 functions as an anode. A phosphor layer 32 such as ZnO:Zn, which is fluorescent at low voltages, is deposited on the conducting layer 30, thereby forming display areas.

A plurality of filamentary cathodes 34 (referred to as filaments hereinafter) are located in the envelope with the conducting layer 30 and heated to thermionically emit electrons. Each filament, which comprises a tungsten core coated with oxides of barium, strontium and potassium, is suspended by supporting members (not shown).

An electron control unit is located between the face glass 20 and the